2013

NSF Funds Study of Cosmic Dust

Kim Hill
Illinois Wesleyan University

NSF Funds Study of Cosmic Dust

Sept. 6, 2013

Image of cosmic dust courtesy of **NASA**, **ESA**, and The Hubble Heritage Team **STScI**/**AURA**

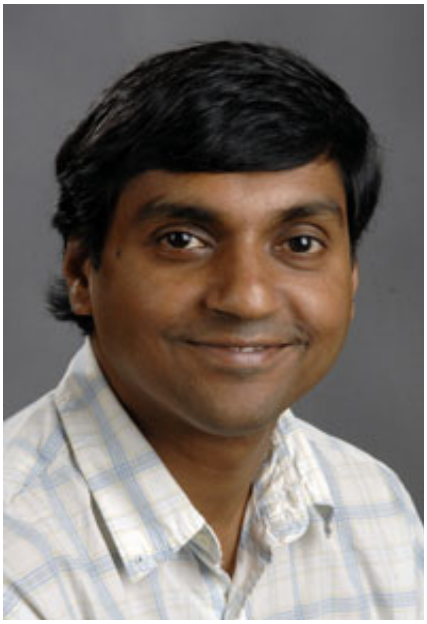
BLOOMINGTON, Ill. – Once considered solely an annoyance to astronomers wishing to observe deep-space objects, cosmic dust is now regarded as significant to the evolution of galaxies, stars and even life in the universe.

Illinois Wesleyan University Assistant Professor of Physics Thushara Perera will study the properties of cosmic dust through a National Science Foundation grant. The $178,261 grant will support obtaining laboratory instruments and fund the stipends for two student research assistants each year of the two-year grant period.

Perera said researchers agree that cosmic dust is significant to star formation. In addition, cosmic grain surfaces are “hotbeds” of chemical activity that ultimately give rise to complex molecules, some of which are prebiotic molecules believed to be involved in the processes leading to the origin of life.

“The thermal emission from many dusty environments is not well understood, however,” said Perera. “Recent laboratory work has shown that the opacity of dust in the millimeter/sub-millimeter optical properties is more complicated than previously thought.”

Perera expects the NSF-funded project to significantly enhance lab data on cosmic analog dusts, leading to greater understanding of the thermal, physical and chemical conditions that prevail in dusty regions of space.



Thushara Perera

Lab equipment utilized in the measurements will include a dry cryocooler and a custom-made Fourier Transform Spectrometer (FTS). To construct the FTS, Perera will adapt the design from an instrument aboard the COBE cosmology satellite. He said it is rare to find a FTS of this sort in the physics labs of liberal arts institutions like Illinois Wesleyan. Both the cryocooler and the FTS will be used in student instructional labs, particularly for courses such as Experimental Physics and Materials Physics, when not being used for research.

Perera joined the faculty at Illinois Wesleyan in 2008 after earning a Ph.D. from Case Western Reserve University. His research area — observational and experimental cosmology — lies at the intersection of physics and astronomy. While a graduate student, Perera worked on detecting dark matter, a hypothesized form of matter that makes up most of the inferred mass of our universe and galaxy. As a postdoctoral researcher at the University of Chicago and later at the University of Massachusetts, Perera developed and used superconducting and semiconducting technologies for millimeter-wavelength

observations of the oldest structures in the universe, such as massive early galaxies and the cosmic microwave background.

“RUI: Experiments on Cosmic Dust Analogs to Determine their Optical Properties in the Millimeter/Sub-Millimeter” is funded through August 2015.

*Contact: **Kim Hill**, (309) 556-3960*